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DOCUMENT NO. 4NO CHANGE IN CLASS. DECLASSIFIEDCLASS. CHANGED TO: TS SC ⑥/1989

NEXT REVIEW DATE:

AUTH: HP 70-2

DATE 2-10-79 REVIEWER: 372044

PROVISIONAL INTELLIGENCE REPORT

PETROLEUM IN THE SOVIET BLOC

AVAILABILITY OF CRUDE PETROLEUM IN THE USSR

CIA/RR PR-17 (I-A)

6 June 1952

Note

The data and conclusions in this report do not necessarily represent the final position of ORR and should be regarded as provisional only and subject to revision. Additional data or comments which may be available to the user are solicited.

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FOREWORD

This report is one of a series of provisional reports pertaining to petroleum in the Soviet Bloc. The entire series is intended to cover all phases of petroleum, natural gas, and synthetic liquid fuels in the Soviet Bloc. These reports are presented as an intermediate step in consolidating pertinent intelligence on the subject and not as a finished study. In the consolidation of the available information, various reports and documents representing research by other intelligence agencies were utilized along with the results of research and analysis by members of the staff of CIA.

It is intended that this series of reports will serve the following purposes:

- a. Represent a base for contributions and additions by CIA and other agencies actively interested in petroleum intelligence.
- b. Facilitate the selection of the specific and detailed gaps in intelligence warranting priority attention.
- c. Provide the basis for a broad study on petroleum in the Soviet Bloc and various studies directed toward specific critical problems.

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(ORR Project 6-52)

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I-A

AVAILABILITY OF CRUDE PETROLEUM IN THE USSRSummary

The estimated net annual increase in oil production in the USSR, which was 4.2 million tons in 1949 and 4.1 million tons in 1950, probably will drop to 3.5 million tons in 1951. Because of weaknesses in the USSR economy it is estimated that the gross annual increase in oil production will decline about 5 percent in 1952 from its high in 1950, and the gross annual increase in 1953 is estimated to remain at the 1952 level.

The combination of the foregoing factors gives the following estimate and forecast of crude oil production in the USSR: 1951, 41.0 million metric tons; 1952, 44.0 million metric tons; 1953, 46.7 million metric tons. The forecast for the fiscal year 1953 is 45.4 million metric tons. Support for these estimates and forecasts is given in the following analysis.

1. Petroleum Resources and Postwar Production.

The current proved reserves and availability of crude oil in the USSR are only about one-fourth and one-eighth respectively of US proved reserves and production capacity. However, estimates indicate that the unexplored and undeveloped petroleum resources of the USSR are substantially larger than those of the US. Because of the time required to explore and develop potential petroleum resources, the short-term availability of petroleum in the USSR is dependent upon the current proved reserves and rate of development, rather than upon the potential petroleum resources of the country. As current proved reserves are estimated at one billion metric tons,

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current annual production is less than 5 percent of proved reserves.

Estimates of post war petroleum production in the USSR are based upon published goals 1/* for the Fourth Five-Year Plan (1946-50) and published reports 2/ of performance in terms of percentage increases over some previous year. In publishing the goals for the Fourth Five-Year Plan it was stated that the annual increase in oil production for the 5 Year period (1946-50) would be 3.2 million metric tons per year, or an increase of 16 million tons for the 5 years, with a 1950 goal of 35.4 million tons. Thus the indicated production in 1945 was 19.4 million tons. Annual goals and estimated actual production in millions of metric tons are as follows:

Annual Goals of Fourth Five-Year Plan and
Estimated Actual Production 1945-50

Year	Indicated Goals		Million Metric Tons	
	Total	Annual Increase	Total	Production Annual Increase
1945			19.4	
1946	22.6	3.2	21.7	2.3
1947	25.8	3.2	25.8	4.1
1948	29.0	3.2	29.2	3.4
1949	32.2	3.2	33.4	4.2
1950	35.4	3.2	37.5	4.1

It will be noted that except for 1946 the annual increase exceeded the planned 3.2 million tons, resulting in a 1950 production of 37.5 million tons instead of the 1950 goal of 35.4 million tons published in 1946.

2. Possible Long-term Availability.

An eventual goal of 60 million metric tons of petroleum a year has been mentioned frequently in the Soviet press and was even the subject in 1947 of a special postage stamp picturing oil facilities and carrying the slogan "60 million

* Footnote references in arabic numerals are to sources listed in the Appendix.

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tons of oil annually." 3/ This 60 million ton goal was specifically mentioned by Stalin in his speech of 9 February 1946, in which several long-term industrial goals were included. Stalin added "that (these goals) will take three more Five-Year Plans, I should think, if not more." This has been assumed by some analysts to indicate tentative plans for attaining the stated goals by the end of three more Five-Year Plans, that is by 1960. Actually, from the phrasing of the translation quoted above, it appears that the tentative plans may have called for the attainment of one or more of these goals during the last of the three Five-Year Plans mentioned, that is at any time during the period 1956-60. If the annual increases in petroleum production of 3.2 million tons announced in 1946 for the Fourth Five Year Plan (1946-50) are added to the announced 1950 goal of 35.4 million tons, an annual production of 61 million tons of oil is indicated for 1958. Assuming a goal of 60 million tons of petroleum annually in some year during the period 1956-60, and an annual increase of 3.2 million tons, planned production of petroleum in the USSR is indicated to be as follows:

Possible Original and Revised Goals of
Petroleum Production in the USSR, 1950-58

Year	Original Goals		Million Metric Tons	
	Total	Annual Increase	Total	Annual Increase
1950	35.4 (planned production)		37.5 (Est. actual production)	
1951	38.6	3.2	41.0 (Est. actual production)	
1952	41.8	3.2	44.4	3.4
1953	45.0	3.2	47.7	3.3
1954	48.2	3.2	50.9	3.2
1955	51.4	3.2	54.1	3.2
1956	54.6	3.2	57.3	3.2
1957	57.8	3.2	60.5	3.2
1958	61.0	3.2		

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If the revised goals shown in the foregoing table are to be attained, petroleum production must be increased from 37.5 million metric tons annually to 60.5 million tons annually, or an increase of 61.3 percent, in 7 years, equivalent to an annual increase of 7 percent. For comparison, in the 7 Year prewar period 1933-40, USSR petroleum production actually increased 45.3 percent from 21.4 million metric tons in 1933 to 31.1 million tons in 1940, or an annual growth of 5.5 percent.

The following tabulated comparisons are of interest in attempting to evaluate the probability of USSR petroleum production increasing from 37.5 million metric tons to 60.5 million tons in the 7 year period 1950-57, as indicated in the foregoing table of possible revised goals covering this period.

Comparative Increases in Oil Production in Selected Areas of the World during Specified Periods.

<u>Region</u>	<u>From</u>	<u>Period</u>	<u>To</u>	<u>Years</u>	<u>Oil Production</u> (million MT)	<u>Total</u> <u>Increase</u>	<u>Annual</u> <u>Increase</u> <u>Percent a/</u>
USSR (Goal)	1950	1957	7	37.5	60.5	61.3	7.0
USSR(Actual)	1933	1940	7	21.4	31.1	45.3	5.5
World	1907	1915	8	36.3	59.4	63.6	6.4
US	1914	1920	6	37.6	62.6	66.5	8.9
Venezuela	1941	1946	5	34.1	58.0	70.1	11.2
Middle East	1940	1949	3	34.3	68.3	99.1	25.8

a/ The percentage annual increase shown is the percent applied annually to the previous years production to attain the final production shown for the last year of the period.

In the light of Soviet prewar and postwar performance and comparable increases in petroleum production in other countries as shown in the above table it is possible that the USSR may attain a production of 60 million tons of petroleum by 1957, assuming peaceful conditions and given the necessary incentives, particularly the need for domestic production of oil in these quantities, in order to attain strategic objectives, or in the overall economic growth of the country.

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The estimated availability of petroleum in the USSR, is shown in the following table covering the period 1947-51.

Estimated Production of Petroleum in the USSR, 1947-51

Year	Total Million Tons	Million Metric Tons	
		Annual Increase Million Tons	Percent
1947	26.8	4.1	18.9
1948	29.2	3.4	13.2
1949	33.4	4.2	14.4
1950	37.5	4.1	12.3
1951	41.0	3.5	9.3

Recent unclassified published reports on the USSR petroleum industry indicate a drop in the current rate of expansion of oil production as compared with 1950.

One source 4/ estimates production of 20.5 million metric tons for the first half of 1951 and a second source 5/ implies a continued drop in the annual increase of USSR oil production by estimating the total production in 1955 at 48 million tons, equivalent to the original goal for 1954. A resume 6/ of current criticisms gleaned from the Soviet press indicates that Soviet oil development is slowing down as a result of slow drilling rates and failure to employ modern techniques, and that poor production practices are causing an excessive decline in current oil production rates. These unclassified estimates and statements on the current petroleum situation are supported by classified material on the Soviet economy that indicates a weakness in the technologic base involving heavy industry, electric power, and transport. One report 7/ implies that shortage of electric power is delaying the expansion of oil extraction throughout the important Volga-Ural region while another source 3/

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indicates an overall retarding of industrial expansion in the USSR in the 1951-55 period. The drop in the annual increase of USSR oil production from 4.1 million metric tons in 1950 to 3.5 million tons in 1951 as shown in the preceding table appears to be justified on the basis of these current reports, and it is also in line with indicated revised goals for this period.

In order to appraise the effect of these retarding factors on the estimated net annual increase in oil production, it is necessary to estimate the annual increment of production required to balance the annual depletion in production from existing wells, and to add this increment to the estimated net annual increase, thereby obtaining the gross annual increase in production resulting from exploitation.

This procedure is an established method in the US oil industry for production forecasts and has been used recently by the Petroleum Administration for Defense (PAD) in forecasting US productive capacity to 1958. ^{9/} Within the limitations of the data available this method has been applied to forecasting USSR oil production for 1952 and 1953 with the results shown in the following table. An annual depletion factor of 10 percent has been assumed for the USSR. This compares with a value of 9.02 percent used by PAD in its recent forecast of US productive capacity. Experience has shown that for major oil producing regions with a fairly normal distribution of production between settled and flush fields, annual depletion rates vary between 8 and 12 percent. If applied to the data on USSR oil production shown in the following table an annual depletion factor of 8 percent would increase the 1953 estimate shown therein by about one percent, while an

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annual depletion factor of 12 percent would decrease the 1953 estimate by a like amount. Therefore, for this analysis, the actual value of the annual depletion is not a critical factor.

Estimated Gross Annual Increase in Oil Production
in USSR - 1946-53

<u>Year</u>	<u>Production</u>	<u>Ten Percent Depletion</u>	<u>Net Annual Increase</u>	<u>Gross Increase Annual</u>	<u>Million Metric Tons</u>	<u>Percent changes in gross annual increase</u>
1946	19.4					
1946	21.7	1.94	2.3	4.24		
1947	25.8	2.17	4.1	6.27	/ 48	
1948	29.2	2.53	3.4	5.93	- 5	
1949	33.4	2.92	4.2	7.12	/ 19	
1950	37.5	3.34	4.1	7.44	/ 5	
1951	41.0	3.75	3.5	7.25	- 5	
1952	44.0	4.10	3.0	7.10	- 2	
1953	46.7	4.40	2.7	7.10	0	

Because of the factors previously cited and discussed, which are retarding oil exploitation in the USSR, it is assumed in the table above that the gross annual increase in oil production will decline about 5 percent from its indicated peak of 7.44 million metric tons in 1950 to 7.10 million tons in 1952 and will remain at that figure in 1953. The estimates of petroleum production in the USSR for the 3 year period 1951-53 are based upon the assumption of peacetime conditions during that period. On the assumption of a war beginning in mid-1952, the oil production for the first year of war could be increased by using larger crifices on flowing wells, thereby producing excessive quantities of gas with the oil. This increased rate of flow would be temporary and would probably result in a loss in ultimate recovery. Very little of this increased oil production for war could be obtained from the

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Caucasus as nearly all wells in that region are on artificial lift rather than on natural flow. It is estimated that the fields in the rest of the Soviet Union, principally those in the eastern region and in Central Asia, could show a 10 percent temporary increase in oil production over estimated peacetime levels for the first year of war. Assuming that Caucasus production for fiscal year 1953 will be about 20 million tons, 10 percent of the remaining production will approximate 2.5 million tons. Therefore, this quantity could be added to the availability for the first year of war. However, for a war lasting 2 years or more, it would be poor strategy to dissipate petroleum resources in this manner. Therefore, this possible forced production is not included in the following short-term estimate.

**Estimated Short-term Availability of Petroleum
From Domestic Production in the USSR
in Peace and War**

<u>Condition</u>	<u>Period</u>	<u>Quantity</u> <small>Million Metric Tons</small>
Peace	Full year 1951	41.0
Peace	First half 1952	21.6
War	Last half 1952	22.4
War	First half 1953	23.0

4. Nature and Reliability of Estimates.

The foregoing estimate of petroleum production in the USSR is the best that can be made on the basis of data now available. For a firmer estimate additional post-war data are needed covering the number of new wells completed annually by regions, the number of drilling rigs operating per year, the proportion of flowing wells in the different oil-producing regions and the productivity of the new deep zones now being explored and developed. Such physical data would provide a basis for projecting

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oil production by fields and districts from the pre war period, for which reliable physical data are available, into the postwar period for which the data are largely in terms of percentages referred to the planned production or to some previous year. This procedure would then provide a test of the reliability of postwar estimates of crude oil production in the USSR, based upon the published statistics in percentages.

A recently published analysis 10/ shows that 1951-52 official statistics published by the USSR may be manipulated or distorted to comply with Communist Party requirements. Information contained in Beriya's speech of 6 November 1951 11/ combined with data in the TASS broadcast from Moscow on 28 January 1952 on results of 1951 production in the USSR, 12/ indicate oil production in 1951 was from 42.7 to 42.8 million metric tons instead of 41.0 million tons as herein estimated. If these current statistics are accepted without modification, the latter estimate would be 2.4 to 3.7 percent low. It appears to be unwarranted to accept these current statistics without further study and evaluation, but they do imply that a possible range from 0 to plus 4 percent might be applied to the estimate of 41.0 million metric tons of oil produced in the USSR in 1951. The corresponding range for 1952 would be 0 to plus 5 percent, and for 1953 it would be 0 to plus 7.5 percent.

5. Regional Production.

The following table on estimated distribution of USSR petroleum production for 1940, 1945 and 1950 shows gains and losses in output by areas during the war and postwar periods.

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USSR Petroleum Production by Regions a/

Regions	1940	1945	Million Metric Tons	
			Plan	Actual
Baku	21.8	11.3	17.1	15.2
(Caucasus				
Grozny-Maikop)	5.1	2.1	4.8	5.6 b/
Eastern (Second Baku and Central Asia)	3.3	4.9	11.8	15.2
Ukraine and Pechora	0.4	0.4	0.8	0.8
Sakhalin	0.5	0.7	0.9	0.8
TOTAL USSR	31.1	19.4	35.4	37.5

a/ Primary source for this table in memo 18 May 1951 from [redacted] Embassy, Moscow, to Department of State. Sakhalin estimated from other sources and 1950 production adjusted. See B. Production and Exploration of Petroleum in the USSR.

b/ Includes Dagestan 0.9 million tons.

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As shown above the actual 1950 production in the Caucasus (Baku and Grozny-Maikop Regions) failed to meet the planned 1950 goal by 1.2 million tons, while the Eastern region exceeded the 1950 goal by 3.4 million tons. Furthermore, the 1950 production from the Caucasus is 6.2 million tons below the 1940 prewar production, whereas the remaining regions have shown substantial increases over prewar producing rates.

a. Caucasus.

Baku was the cradle of the Russian oil industry, and Baku and Grozny occupy first and second places, respectively, in the history of oil production in the USSR with initial production dating back 60 to 80 years for some of the fields in these regions. Other oil-producing areas in the Caucasus are Kuban-Maikop, Dagestan, and South Georgia. About 40 percent of the 165 oil fields and about three-fourths of the 15,000 oil wells estimated to be in the USSR are located in the Caucasus between the Black and Caspian Seas. Although the sedimentary basins of

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the Caucasus account for only one-ninth of the "primary" potential oil-producing area of the USSR, the oil fields discovered and developed to date in these basins account for about three-fourths of the cumulative total oil produced in the USSR up to 1950.

Restoration of the war-damaged oil fields in the Caucasus has not been as successful as was anticipated in 1946, and it appears unlikely that these oil producing regions will show any substantial increase in production rate within the next 2 years. Depletion rates are known to be high in these Caucasus fields producing from Tertiary formations. Under such conditions a relatively high rate of development is needed merely to offset the annual decline, so that actual increases in the production rate demand a very high development rate. It is probable that most of the postwar increase in production from Baku and Grozny-Maikop fields occurred in 1946-47 and reflected the effect of restoring war-damaged fields to production during that period.

In 1940 the Caucasus produced 36.5 percent of the total USSR oil production; while in 1950 only 35.2 percent came from this region. The disastrous decline in Soviet oil production from a normal peacetime figure of 31.1 million metric tons in 1940 to 19.4 million tons in 1945 can be attributed to direct or indirect losses in the Caucasus caused by World War II. Projecting the prewar trend of a 5.5 percent annual increase in USSR oil production, to 1945 and comparing the results with actual wartime production, 13/ gives a total indicated wartime loss in petroleum production from 1941 to 1945 inclusive of 75 million metric tons. The oil-producing facilities of the Kuban-Maikop district were destroyed in advance of German occupation, and

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facilities in other districts were seriously damaged by the German invasion.

Adding to this the inevitable wartime lack of maintenance and repair so essential in the older oil fields, reasons for the decline in Soviet oil production during World War II are obvious.

The estimated postwar oil production of the USSR for the 7 years 1945-51 shows an annual increase from a high of 18.9 percent in 1947 to a low of 9.3 percent in 1951. A substantial part of these annual increases in the first few years following the war can be attributed to the restoration of prewar production in the Caucasus fields and to the rehabilitation and modernization of producing facilities in those fields. It appears that this program is being continued but that the results are currently unsatisfactory, with the Baku district attaining only 33.9 percent of its 1950 goal. In any wide spread program of oil field rehabilitation under a single management and extending over several years the results are certain to be less productive in the latter phases because of the natural tendency to rehabilitate the potentially best wells first. Likewise, in modernization, those wells which will show the best response are equipped first. Furthermore, it is certain that wartime operations resulted in losses in ultimate recovery from some of these Caucasus fields, losses which are now becoming apparent in lessened productivity.

Although the long-term prospects for increased oil production in the Caucasus are good, as the sedimentary basins there have not been fully explored, estimates of short-term availability will be limited by the conditions described here. Until

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such time as new, noteworthy oil deposits are discovered and developed in the Caucasus, the inevitable natural decline in production from the present fields will absorb the increases which may be obtained from minor discoveries and extensions, and continued modernization efforts in this region. Therefore, no net increase in oil production from the Caucasus is considered likely within the next 2 to 3 years.

b. Eastern Regions.

(1) The Second Baku. In appraising the Soviet Union's short-term availability of petroleum the new oil fields in the Volga-Ural-Kama River valleys, or so-called Second Baku, are of predominant importance. In 1939 this region produced only 6.24 percent of the USSR's oil, but in 1950, 30.74 percent was from this source. Twenty or more fields have been discovered and at least partially developed, with many more prospective fields discovered or mapped. Several thousand new wells were planned for this region in the 5 year period 1946-50, ^{14/} and the substantial increase in oil production in the Second Baku during this period indicates the success of this development program. Exploration in this region is well ahead of development, so that proved or semiproduced areas are sufficient for development drilling over the short term, say 2 to 3 years. However, it is probable that the best prospects have been tested and developed, so that, barring unexpectedly favorable results, the over-all exploitation of petroleum resources in the Second Baku may be on the threshold of being affected by the law of diminishing returns. Another 5 years of exploration and development will reveal the extent of this trend, if it is present.

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Petroleum production in the Second Baku was initiated by discovery of the Gorodki field in the Kuma River Valley in 1929. This was followed by the discovery of the important Ishimbayev field in the Ural River Valley in 1932 and of the Syzran field in the Volga River Valley in 1934. Since that time several important fields have been discovered and developed particularly in the drainage basins of the Volga and Ural Rivers. Recent reports 15/ indicate a large, highly productive oilfield is being developed at Oktyabrsk in Western Bashkir SSR. This field is on the Ik River, a tributary of the Kama River. An oil pipeline 90 centimeters in diameter is reported to have been completed to Ufa by November 1949. In a direct line the distance is 170 kilometers. Such a large line over this distance would transport a large quantity of oil even at relatively low operating pressures. A substantial part of the oil produced in excess of the planned 1950 production, amounting to 2.1 million metric tons could have come from this new Oktyabrsk field. It is near the Tuymazy Field discovered in 1938, which was a prolific producer during and following World War II.

The entire area of the Second Baku, known as the East Russian basin, contains nearly 125,000 square miles of prime prospective oil lands. It is roughly comparable in size and in potential oil resources to the Permian Basin of west Texas and New Mexico, which is currently producing more oil than is the entire USSR. The petroleum and natural gas resources of the Second Baku are well located to supply the rapidly expanding industrial needs in the Moscow-Gorki-Kuibyshev and Urals industrial areas.

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The continued development of the petroleum resources of the Second Baku is of outstanding importance in the future economic growth of the Central Industrial Region, the Volga Region, and the Urals, comprising the heart of the USSR with a population of over 50 million and an area of 700,000 square miles. Petroleum products and natural gas from the Second Baku can greatly accelerate the industrial growth of this important area under favorable conditions. 1c/

(2) Central Asia. An extensive region in which new discoveries have accelerated USSR postwar petroleum production is in the large Kazakh SSR and adjacent smaller republics of Turkmen, Uzbek, Tadzhik, and Kirgiz to the south. The most important oil producing area in this region is the Emba basin in the Kazakh SSR. This basin and the Turkmen-Uzbek basins together contain nearly one-half million square miles, or over one-third of the prime prospective oil area of the Soviet Union.

The potential petroleum resources of Central Asia are very large and this area may eventually assume a dominant position in the production of oil in the USSR. It appears likely, however, that estimates of short-term availability can be safely based upon the rather low postwar rate of development of these resources. Their location with respect to industrial demand and existing transport and refinery facilities will continue to limit the development rate for the next 2 to 3 years.

c. Ukraine and Pechora.

(1) The Ukrainian SSR contains two minor and widely separated petroleum areas, the Carpathian region in the extreme west comprising the Galician oil and gas fields formerly in Poland, and the eastern Ukraine region near Romny and Sumy.

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These two regions accounted for less than one percent of the USSR's oil output in 1950, and prospects are not favorable for substantially increasing this proportion.

(2) Although classified as a secondary potential area, the Pechora Basin in the far north of the European USSR, with 123,000 square miles of sediments, has accounted for at least five producing fields since 1939, with a total production of 480,000 metric tons of oil, or 1.28% of USSR total in 1950. Because of its isolation and severe climate it is not likely to contribute more than one or two percent of USSR total oil production over the short-term.

d. Sakhalin Island.

Despite exploratory drilling beginning in 1889, oil was not discovered on Sakhalin Island until 1909, and it was not until 1923 that actual development and steady production of oil was established. There are now three producing fields and four additional areas considered proved but not yet developed. Total production to date is estimated at 7.6 million metric tons and proved and probable reserves exceed 30 million tons. Current production is approaching one million metric tons per year and is expected to show a steady future growth to a probable maximum of 2 million to 3 million tons a year. Although yielding only 2 percent of Soviet oil production, the Sakhalin Island oil fields are of great strategic value in the industrial development and population growth of the Soviet Far East, comprising an area of 1.2 million square miles with a present population of less than 4 million people.

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Reflecting the high standing of Soviet geologists amongst international scientists before the "Iron Curtain" was imposed, petroleum exploration in the USSR is constantly well in advance of exploitation. About 500 probable oil-bearing structures have been mapped in the Second Baku and more than 1500 salt domes located in the Baku region. 17/ Recent reports 18/ claim that very deep oil deposits ranging down to 20,000 feet have been located by geophysical methods in the Baku region. Limited petroleum exploration in Eastern Siberia, comprising nearly 3 million square miles, has reportedly resulted in oil discoveries along the southwest shore of Lake Baikal, in the Aldan River basin, and on the Kamchatka Peninsula.

The relative proficiency of the Ministry of Geology in oil exploration holds great promise for the long-term increase in Soviet oil production. However, for the short-term these potential resources will not be significant, because of the technological handicaps to their exploitation under the Ministry of Petroleum.

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APPENDIX

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